



FOREST SERVICE

CHESAPEAKE FOREST FY2004 ANNUAL WORK PLAN



Chesapeake Forest
Michael G. Schofield, Forest Manager
6095 Sixty-Foot Road
Parsonsburg, MD 21849
(410) 543-1888

www.dnr.state.md.us/forests/chesapeakeforest

CHESAPEAKE FOREST ANNUAL WORK PLAN SUMMARY

This document summarizes the proposed activities that will occur on the Chesapeake Forest during the 2004 fiscal year. The fiscal year runs from July 1, 2003 to June 30, 2004. The following proposed activities are the results of a multi-agency effort. The multi-agency approach has ensured that all aspects of these lands have been addressed within the development of this plan.

Plan Activities

Network with Maryland DNR agencies:

- Wildlife & Heritage – Identify and develop restoration projects, report and map potential Ecological Significant Areas (ESA) as found during fieldwork, release programs for game and non-game species. Mapping will be done with Global Positioning Systems (GPS). Participates on the Inter-Disciplinary Team (ID Team) and assists in the development of a forest monitoring program.
- Natural Resource Police – Enforcement of natural resource laws on the forest.
- Resource Planning – Provides assistance in the development of plans, facilitates meetings with various management groups, develops Geographic Information System (GIS) maps for public review, conducts deed research and boundary recovery. Participates on the ID Team.
- Maryland Conservation Corps (MCC) – Assists in painting boundary lines, installing gates and trash removal.
- State Forest & Park Service – Participates on the ID Team.
- Chesapeake & Coastal Watershed Service – Develops watershed improvement projects, assists in the development of a forest monitoring programs and participates on the ID Team.

Network with other agencies:

- The Conservation Fund – Provides guidance in the development of management activities on the forest.
- The Chesapeake Bay Foundation – Identifies sites for future water quality improvement projects.
- Vision Forestry, LLC – Designs and implements management activities on the gifted half of the forest. Participates on the ID Team.

- National Wild Turkey Federation – Establishes and maintains handicap-hunting opportunities within the forest.
- US Fish & Wildlife Service – Assists in prescribed burns for Delmarva Fox Squirrel (DFS) habitat.
- Maine Forest Service, Department of Conservation – Field tests new monitoring techniques and protocols for Best Management Practices (BMP).

Network with Universities and Colleges:

- Salisbury University – Conducts species monitoring, a vegetative cross sectional study, and water quality improvement studies.
- Virginia Polytechnical Institute and State University – Conducts loblolly pine growth and yield studies.
- University of Georgia – Studies wood properties of loblolly pine growing on similar soils throughout the southeast region.

Maintenance:

- Repaint existing boundary lines to state specifications (yellow) on over 238 separate tracts.
- Replace hundreds of cable gates with standard farm-style gates & locks.
- Conduct Road Maintenance (i.e. brush clearing / mowing).
- Maintain access roads and ditches.
- Clean up illegal trash dumping sites.

Recreation:

- Create an informational brochure for the forest highlighting sustainable forestry.
- Identify and prepare tracts for public use.

Special Projects:

- Update and maintain forest information on a GIS database.

- Establish a detailed forest-monitoring program.
- Conduct information and educational opportunities on the forest including orienteering through the Regional Education Specialist.
- Inventory and protect historic sites (i.e. cemeteries).

Silvicultural Activity Overview

As Table 1 illustrates, the 2004 annual work plan proposes the following silvicultural activities for approximately 4,557 acres (7.8% of the CFL).

Table 1. Overview of Proposed 2003 Activities.

Activity	Acres
1. Final Harvest	175
2. Selection Harvest	51
3. Commercial Thin #1	1,822
4. Commercial Thin #2	1,636
5. Pre-commercial Thinning	0
6. Mechanical Site Preparation	0
7. Planting	550
8. Watershed Improvement Project	36
9. Aerial release, natural stands	0
10. Mid-rotation vegetation control	1,123
11. Fertilization	380
12. Prescribed Fire	604
13. Restoration Projects	221
Total acres affected*	4,557

* Total acres effected are not the sum of all acres to be treated because many acres are scheduled for multiple activities (e.g. site preparation, planting and grass control or spray-fertilize). Efforts to minimize soil disturbance and promote natural regeneration should reduce the acres affected. The two types of harvest (final and selective) will effect about 226 total acres. However, several tracts will have significant buffers, which will reduce the harvest acreage accordingly. The current GIS database is not accurate enough to give an accurate acreage, but will be updated with new stand boundaries (using GPS) as stand prescriptions are laid out in the field.

The following is a list of definitions of proposed management activities that will occur on the Chesapeake Forest.

Final Harvest – A final harvest prescription shifts the management attention to the next generation of trees. The goal for each stand is to match the harvesting technique to the site conditions in order to achieve successful regeneration. These sites will often, but not always, be regeneration harvests. The first choice is to encourage natural regeneration if the seed source is available and the pine component is healthy. If natural regeneration is well established in the understory, the harvest type may be a shelterwood or modified shelterwood cutting. Each harvest prescription will be determined in the field on a site-by-site basis.

Selection Harvest – This includes the removal of single trees and groups of trees within a given stand. This method will be used to distribute age classes and to adjust species composition within a given stand.

Improvement Harvest – This type of harvest is designed to remove less desirable trees of any species from a stand. The goal is very site-specific, and will depend on the condition of the site and existing stand. Each harvest will be guided by specific prescriptions that are noted in the field and forest plan.

Riparian Buffer Zone Establishment – Riparian buffer zones are vegetated areas adjacent to or influenced by a perennial or intermittent bodies of water. These buffers are established and managed to protect aquatic, wetland, shoreline, and/or terrestrial environments. Boundaries of riparian buffer zones will be marked, surveyed (GPS) and mapped (GIS). Selective harvesting and/or thinnings may occur in these areas to encourage a mixed hardwood-pine composition.

Prescribed Fire – Prescribed fires are set deliberately, under proper supervision and weather conditions, to achieve a specific management goal such as enhancing wildlife habitat, encouraging fire-dependent plant species, reducing fuel loads that feed wildfires, and preparing sites for planting.

Pre-Commercial Thinning – Pre-commercial thinning is the removal of trees to reduce over crowded conditions within a stand. This type of thinning concentrates growth on more desirable trees. This treatment will be carried out by hand crews on stands 5-10 years of age. The number of trees retained will depend on growth and condition of the stand.

First Commercial Thinning – This will occur on plantations at age 12-20 years old to facilitate forest health and promote development of larger trees over a shorter amount of time. This is accomplished in plantations by removing every 5th row of trees and selectively thinning between rows. In naturally regenerated stands, thinning corridors will be established every 50 feet and the stand will be selectively thinned along both sides of the corridor. Approximately 30-35% of the total stand volume will be removed in this process.

Second Commercial Thinning - Usually performed on stands 20-28 years old. The objective is to lengthen the rotation age of the stand and produce larger trees. In some cases, this technique is used to improve habitat for the Delmarva Fox Squirrel (DFS) and Forest Interior Dwelling Species (FIDS). Approximately 30-35% of the total stand volume will be removed in this process.

Reforestation – Reforestation reestablishes forest cover either naturally or artificially, and is usually accompanied by some kind of site preparation during the same fiscal year. The nature of the site preparation will be determined by field examination. It is almost always followed, in the same fiscal year, with grass control in the form of chemicals (hand-applied by ground crews). Site conditions will dictate application rates, etc., in each case.

Aerial Release Spraying - An aerial spraying is used to reduce hardwood competition in slower growing young pine stands or to eliminate exotic species. This will generally be done on natural stands that have had a pre-commercial thinning to encourage the desired pine stand. Prior field examination and exact boundary locations will be established in each case. All forms of aerial spraying are based on precision GPS mapping and accompanied by on-board flight GPS controls. GPS-generated maps shows each pass of the aircraft and are provided by the contractor to demonstrate precision application. No aerial applications are allowed over riparian or wetland areas or forest buffers.

Ground Spraying – A ground application is used to discourage unwanted hardwood competition in the understory. This treatment is typically done a year or two after a successful thinning to open up the understory and reduce competition for the dominant trees. Each stand will be evaluated for application rates, etc., as well as locations to protect desired hardwood species or islands within a stand.

Fertilization – Fertilizers are nutrients applied to the site to increase tree growth by overcoming nutrient deficiencies in the soil. Soil tests are taken prior to application to guide formulation and application rates as required by the Nutrient Management Plan. These nutrients are typically urea-based and are applied on the ground during thinning operations. To reduce the opportunity for nutrient input into nearby waters, fertilizers are not applied in riparian forest buffers.

**Locations & Descriptions
Of
Silvicultural Activities**

Description of 2004 Activities – Dorchester County

1. Complex D25-S3

Hoernecke Tract (4242):

A first thinning is proposed for stand 1 (91.9 acres). This stand has an average basal area (BA) of 180 sq. ft. / acre. The stand is a 14 year-old loblolly pine plantation.

Oliphant Tract (4245):

A second thinning is proposed for the easterly 2/3's of stand 1 and the entire stand 2. The western portion of stand 1 is mixed hardwoods. Total area to be thinned is 49.5 acres. Both stands have an average BA of 150 sq. ft. / acre. The stands are 25 and 23 years old respectfully.

2. Complex D20-S3

Trice Tract (4222):

A second thinning is proposed for stands 2 (53.6 acres) & 6 (5.5 acres). Both stands are 23 years old. Average BA is 120 sq. ft. / acre in this loblolly pine plantation. A first thinning is proposed for stand 5 (50 acres). Stands 2, 5 & 6 are adjacent to one another. There will be two small clear cuts within this area to enhance a rare herbaceous plant community. Prescribed fires are proposed post thinning.

3. Complex D12-S3

Puckham Tract (4205):

A second thinning is proposed for stand 7 (101.5 acres). This stand is a 29 year-old loblolly plantation. Average BA is 100 sq. ft. / acre in this loblolly pine plantation.

4. Complex D13-S3

Wheatley Tract (4230):

A first thinning is proposed for stand 2 (14.6 acres) in this 16 year-old pine plantation. Average BA is 140 sq. ft. / acre. A prescribed fire is proposed post thinning.

Description of 2004 Activities - Wicomico County

1. Complex W10-S2

Wright (3518), Mills (7133), and I. James Wright Tract (7137):

First thinnings are proposed for stands 1 and 6 of Wright (37.6 acres), stands 2,4,and 5 of Mills (~115 acres). These loblolly pine stands are currently 14-16 years old.

2. Complex W14-S2

Bateman (7147), Culver (7118), and Helmick Tract (3517):

A first thinning is proposed for stand 1 of the Helmick (7.2 acre), stands 1 and 3 of the Culver (44.7 acre), and stands 1 and 4 of the Bateman (130 acre) tracts. Reduced rates of herbicide or prescribed burning are proposed to control undesirable hardwood species.

3. Complex W23-S2

Lynch (7101), Green Hill (7102), Austin (7107), and Brown Dashiell Tract (7122):

A first thinning is proposed for a 425-acre loblolly pine stand. The stand is a 14-17 year-old plantation that contains a wet grassland in the center. A prescribe burn is proposed for the wet grassland (20 acres) to maintain it in an early successional stage. The northeasterly portion of the stand will be sprayed prior to thinning to control Mile-a-Minute Weed.

A final harvest is proposed for the westerly portion of stand 7 and 15 (92 acres) of the 14-17 year-old pine stand. This final harvest is designed to help redistribute the young age classes on the Chesapeake Forest. Natural regeneration is preferred for this planned harvest. However, if natural regeneration of pine does not occur, several options may be explored. One is to re-plant the entire site with loblolly. The second option is to plant according to mini-sites, with pines on the higher soils and hardwoods in the wetter sites. The long-range goal is to establish larger areas of large trees, with more hardwood in the overstory. Breaking up this large area of almost even-aged plantations will contribute to creating this diversity.

4. Complex W35-S2

Stephen (3533) and Schuler #2 (3562):

An herbicide spray and fertilization is proposed for stand 1 on both complexes. Both stands are 23 years old. Total area is 36 acres. A Nutrient Management Plan will guide fertilization.

5. Complex W37-S2

Farlow (3555):

An herbicide spray and fertilization is proposed for stand 1. This 16-acre stand is a 19 year-old plantation. A Nutrient Management Plan will guide fertilization.

6. Complex W57-S2

Willie Tract (3513):

A stand shaping treatment is proposed for stand 1 (43 acre). This stand is a cutover merchantable stand that should be selectively harvested to favor loblolly and oak. An understory burn is proposed to reduce competition and undesirable species.

7. Complex W46-S3

Powell Tract (3554):

A first thinning is proposed for stands 2 and 4. Total area is 58.3 acres. Both stands are a 21 year-old pine plantation. Average BA is 200 sq. ft. / acre. The retention of mast producing hardwoods will occur where possible.

Webb Tract (3570):

A first thinning is proposed in stands 2 and 5 of this loblolly pine plantation. The stands are 20 and 17 years old respectively. Total area of stands 2 and 5 is 102.7 acres. A prescribed fire is proposed post thinning.

Davis Tract (3536):

Restoration Project

Based on a restoration plan to be developed by the Heritage Department, stand 4 will have a silvicultural prescription to help restore the ecological system of the area. This prescription will include a thinning or a final harvest (or a combination). This will involve the enlargement of the current bay areas, establishing a mixed oak-pine stand on the majority of the site through prescribed burning, and reintroduction of shortleaf pine on xeric dune sites. The boundaries and specifics of the operation in relation to the Carolina Bays and xeric dune communities will be specifically defined within the restoration plan. Average BA is 150 sq. ft. / acre in this 17 year-old loblolly pine plantation. Total area will be 115.4 acres.

Campbell Tract (3539):

Restoration Project

Based on the previously described restoration plan, stand 5 will have a silvicultural prescription that will help restore the ecological system of the area. Stand 5 is a 17-year old loblolly pine plantation with an average BA of 120 sq. ft. / acre. The total area is 40.2 acres.

Adkins-Davis No.2 (7123):

Restoration Project

Based on the previously described restoration plan, stand 4 will have a silvicultural prescription that will help restore the ecological system of the area. Stand 4 is a 15-year old loblolly pine plantation. The total area is 46.6 acres.

Vaughn-Richardson (3507):

Restoration Project

Based on the previously described restoration plan, stands 3&4 (19 acres) will have a silvicultural prescription that will help restore the ecological system of the area.

8. Complex W29-S3

White Tract (3525):

A first thinning is proposed in stand 1, which is a 30 year-old natural loblolly pine stand (65 acres). A selective harvest is proposed for stand 2 (8.2 acres) that is located within and adjacent to stand 1. Stand 2 is a fragmented 50 year-old natural loblolly pine stand. Stand 1 has an average BA of 150 sq. ft. / acre and stand 2 has an average BA of 180 sq. ft. / acre. Both stands should be burned following the thinning/selective harvest to control understory vegetation. Dominant and co-dominant mast producing hardwoods will be retained. Total area is 73.2 acres.

9. Complex W09-S3

Calloway Tract (3547)

A second thinning is proposed for stand 1 (40 acres) in this loblolly pine plantation. The stand is 29 years old with an average BA of 100 sq. ft. / acre. A prescribed burn is proposed post thinning to promote oaks.

10. Complex W21-S3

Horner Tract (3599):

A first thinning is proposed for stand 1 in this 40.9-acre stand/tract. The stand is a 16 year-old loblolly pine plantation with an average BA of 150 sq. ft. / acre. A riparian buffer will be established on the southeastern boundary of this stand.

Description of 2004 Activities – Worcester County

1. Complex WR01-S2

Donaway Tract (3711):

An herbicide spray and fertilizer application is proposed for this 48.4-acre tract. This 21-year-old stand of loblolly pine was thinned in 2001. The herbicide spray will be used to control undesirable hardwood competition. The fertilizer is being applied to nutrient deficient soils as specified under a Nutrient Management Plan for the site.

2. Complex WR14-S2

Hopkins-Timmons Tract (3747):

An herbicide spray and fertilizer application is proposed for this 117-acre stand 3. This stand of loblolly pine was thinned in 2001. The herbicide spray will be used to control undesirable hardwood competition. The fertilizer is being applied to nutrient deficient soils as specified under a Nutrient Management Plan for the site.

3. Complex WR39-S2

W.T. Byrd Tract (3717):

A final harvest is proposed for stand 4 (33.8 acres), a 52 year-old pine plantation. The stand should produce adequate seedlings for natural regeneration. There will be a 150-foot riparian buffer established along the ditch on the southwest corner. The riparian buffer will be thinned to encourage hardwoods. A post harvest prescribed burn is proposed for this stand.

4. Complex WR24-S3

Johnson & Johnson Tract (3714):

A second thinning is proposed for stand 9 in this 66.5-acre loblolly pine plantation. The stand is 34 years old with an average BA of 170 sq. ft. / acre. An aerial spray (at a reduced rate) is proposed to control undesirable understory hardwood vegetation after the thinning operation. Further spray modifications may occur based on ongoing experimentation.

5. Complex WR19-S3

Priscilla Pusey Tract (3781):

A first thinning is proposed for stands 5, 6, and 7 in this loblolly pine plantation. The stands are 22, 18, and 17 years old respectively. Average BA is 160 sq. ft. / acre. A prescribed burn is proposed for 19.7 acres in stand 6, which occupies a sand ridge. Total area for the thinning is 108.1 acres.

6. Complex WR01-S3

Timmons Tract (3731):

A first thinning is proposed for stands 5 and 6 in this loblolly pine plantation. The stands are 19 and 18 years old respectively. Average BA is 175 sq. ft. / acre. Total area to be thinned is 86.7 acres. An herbicide spray application is proposed after the thinning to control hardwood competition. Spraying will not occur in the westerly portion of stand 6.

7. Complex WR34-S3

Selby Tract (3765):

A second thinning is proposed for stand 3 (130.7 acres). This stand is a 25 year old loblolly pine plantation with an average BA of 120 sq. ft. / acre.

A first thinning is proposed for stands 5 and 10 (55.9 acres). These stands are 15 and 18 years old respectfully. Stand 5 has an average BA of 120 sq. ft. / acre while stand 10 has an average of 160 sq. ft. / acre.

8. Complex WR36-S3

Mathews Farm Tract (3718):

A second thinning is proposed for stand 5 (40.6 acres). This stand is a 31-year old loblolly pine plantation with an average BA of 120 sq. ft. / acre. Heavy thinning will occur in stand 5 south of the woods road to encourage hardwood vegetation (FIDS & DFS management).

Description of 2004 Activities – Somerset County

1. Complex S02-S2

Crane (4834) and Kemp Tract (4859):

A first thinning is proposed for stand 1 on the Crane (91.3 acre) and stand 1 on the Kemp (19.6 acre). Both stands are in a core DFS area and will be managed accordingly. A 300-foot riparian buffer will be established on the north side of the stands.

2. Complex S04-S2

English (4870), Pinckett (4880) and Milligan Tract (4815):

Aerial release/spraying at a reduced rate and fertilization is proposed for stand 3 on English (26.1 acre). This stand is a 20 year-old natural pine-hardwood stand that occurs in 3 separated areas. Each of the areas will be evaluated prior to treatment to assure that the best treatment package is prescribed.

It is also proposed that stands 1 and 2 on Pinckett (28.6 acre) and stand 1 on Milligan (38 acre) are also sprayed at a reduced rate and fertilized. Fertilization is only proposed for nutrient deficient soils and guided by a Nutrient Management Plan.

3. Complex S18-S2

Bowland (4811), Smullen #1 (4818) and Smullen #2 Tract (4819):

An herbicide spray and fertilization application is proposed for stand 3 on Bowland (51 acre), stand 2 on Smullen #1 (17.5 acre) and stand 1 on Smullen #2 (54 acre). All stands were thinned in 2001, and will be 20-25 years old in 2004.

4. Complex S21-S2

Wilford (4809), E. Mace Smith (4847), E. Mace Smith #3 (4861), and E. Mace Smith #2 (4863):

Second thinnings are proposed within this large complex. Stands proposed for thinning are 25-33 years old (550 acres) and well distributed throughout the complex. This proposed thinning is within a DFS area and will be conducted according to DFS management guidelines. Heavy thinning will occur within the ESA boundaries found on tract 4847. In addition, a final harvest is proposed along the road (150 feet wide) on the eastern portion of tract 4847. This final harvest will enhance the habitat for a rare herbaceous plant that occurs along the roadway.

5. Complex S22-S2

Reid Tract (4899):

An herbicide spray and fertilization is proposed for stand 1. This 38.5-acre stand is a 20 year-old plantation that was thinned in 2001. A Nutrient Management Plan will guide fertilization.

6. Complex S30-S2

Amity Hall (4840) and Hamlet Tract (4844):

A final harvest is proposed for stand 1 and a portion of stand 6 on the Hamlet Tract (49 acres). This final harvest is designed to redistribute the age classes across the forest by reducing the inventory of plantations in the 14-17 year age group. Natural regeneration will be the primary means of regeneration. Planting will occur if natural regeneration of loblolly pine fails.

The new plantation will be designed towards the goal of growing long-rotation pines for DFS habitat.

A first thinning is proposed for most of stand 6 on the Hamlet and stand 5 on the Amity Hall (155 acre). These are 15-year old stands that will be managed for long rotation pine forests in this core DFS area. A riparian buffer will be established on the southeast side of this stand and managed to promote the development of a hardwood overstory.

7. Complex S34-S2

Lankford Tract (4843):

An herbicide spray and fertilization is proposed for stand 1. This 90-acre stand is a 34 year-old plantation that was thinned in 2001. A Nutrient management Plan will guide fertilization.

8. Complex S36-S2

Backfield Tract (5431):

A first thinning is proposed for this 17 year-old stand (58 acres) of loblolly pine.

9. Complex S40-S2

Haislip Barnes (5407), Henss (4872), and Cullen Tract (5432):

A mid-rotation release spraying and fertilization is proposed for stand 1 on Haislip Barnes (48 acre), stand 1 on Cullen (60 acre) and stand 1 on Henss (23.4 acre). Henss is a thinned pine stand with an extremely dense hardwood understory.

10. Complex S14-S3

West Post Office Tract (5447):

A first thinning is proposed for stand 2. This is a 16-year old loblolly pine plantation with an average BA of 160 sq. ft. / acre. An herbicide application at a reduced rate is proposed post thinning to control gum and maple. Total area to be thinned is 40.5 acres.

11. Complex S24-S3

Oriole Tract (4842 / 4849 / 5428 / 5469 / 5474 / 5475 / 5479):

An aerial herbicide spray is proposed to control an outbreak of phragmites as a result of a 1000+-acre wildfire. It is proposed that the 550-acre site be replanted with loblolly pine. Oaks and cypress will be incorporated into the planting to establish diversity.

12. Complex S23-S3

Clarence Laird Tract (5468):

A first thinning is proposed for stand 1. This stand is a 24.7-acre loblolly pine plantation.

**Locations & Descriptions
Of
Watershed Improvement Projects**

PUCKUM BRANCH STREAM RESTORATION PROJECT

BACKGROUND

The Puckum Branch is a 4-mile long stream that runs in a westerly direction from its headwaters near Finchville, Maryland towards Marshy Hope Creek. The majority of the headwaters has been channelized and ditched which run for approximately 1 mile in and alongside existing agriculture fields. The remainder of this stream runs through forested areas that have been in varying stages of silvicultural practices. While the part of the stream, which runs through the Chesapeake Forest Property, has a well-established riparian forest buffer, much of it has also been channelized. This channelization is evidenced by the unnaturally straight planform of the channel. This channelization is evident throughout the majority of its course through the Chesapeake Forest property boundaries.

Approximately 3/4 of a mile west of the intersection of the Puckum Branch and Puckum Branch Road, the stream reverts back to its natural course. At this point the stream exhibits the typical sinuosity and meandering nature of a stream within this physiographic region. Here, the stream twists and turns throughout the floodplain. In addition, the baseflow water surface elevation of the stream is closer to the floodplain elevation.

As you progress further down stream (approximately 1 mile west of the intersection of Puckum Branch and Puckum Branch Road), there is an existing pond. This pond was originally formed by the construction of a berm/embankment that effectively impounded the water to form a pond of approximately 8 acres. The embankment is severely eroded and appears to have breached in a few areas. However, beaver have succeeded in building a dam just inside of the eroded embankment, which has effectively maintained the elevation of the pond.

Beyond the pond, the Puckum Branch winds its way through forested areas for another 1,000 feet where it becomes a tidal stream system. The stream continues for another 1200 feet where it joins with Marshy Hope Creek.

RELATIONSHIP TO CHESAPEAKE FOREST LAND

About 2/3 of the Puckum Branch is located within the boundaries of the Chesapeake Forest Land. This is the bottom, or downstream 2/3 of Puckum Branch. The majority of the property is in existing silvicultural practice. The stream and associated floodplain are considered to be nonoperable areas, are not intended as forest harvest areas and will be managed as forested riparian buffers.

The remaining 1/3 of the Puckum Branch lies upstream of the Chesapeake Forest property. As described earlier, most of this is ditched and runs through existing agricultural land.

EXISTING SITE CHARACTERISTICS

The Puckum Branch has a well-defined floodplain area. The floodplain is well vegetated with maturing trees such as red maple, tulip poplar, sweet gum and a variety of oaks. The floodplain varies in width (approximately 175 ft. across at the upper end and 350 ft. across at the lower end) and is reasonably intact and undisturbed. The primary soils in the upland areas surrounding the

floodplain are comprised of loamy sandy soils (Galestown and Sassafras soil series). The soils in the floodplain and riparian areas are comprised of mixed alluvial material. All of the floodplain area within the boundary of Chesapeake Forest has been mapped as non-tidal wetland. While this determination appears to be correct, the hydrology of the floodplain has been altered due to the channelization of the Puckum Branch.

The ditching and channelization of the Puckum Branch through the Chesapeake Forest Land property has resulted in altering the frequency of over bank flooding. The water surface elevations in the ditched areas are much lower than in areas of the stream where ditching does not occur. This causes a hydrologic disconnect between the stream and its associated floodplain. It can also result in increased streambank erosion due to confined stream energies in the channel during storm events rather than being dissipated over the floodplain.

RESTORATION PROPOSAL

The goal of this project would be to: **Restore the stream/floodplain connection along 1.25 miles in the channelized area of Puckum Branch.** This would increase the floodplain function by:

- Attenuating storm and flood flows;
- Allowing more residence time for storm and flood flows;
- Providing nutrient uptake and storage in the floodplain; and
- Restoring the habitat value within the floodplain.

Increasing stream/floodplain interaction would be accomplished by increasing the water surface elevation of the stream. This would be achieved by:

1. Placing a series of grade control structures in the stream to increase the water surface elevation. Grade control structures could be comprised of large wood logs or rock; and/or
2. Reducing the width of the stream by placing soil within the stream channel. This would change the current stream width dimension and result in increasing the water surface elevation.

PROJECT BENEFITS

The current land use in the headwaters of the Puckum Branch is agricultural. Soybeans, corn and chickens are the primary product. Chicken manure is regularly spread on the fields as fertilizer. By restoring the connection between the stream and its associated floodplain downstream of the agricultural activities, water quality benefits can be greatly enhanced. This project provides the opportunity to improve water quality and provide significant enhancements to the wildlife habitat within the floodplain of the Puckum Branch.

ESTIMATED COST = \$85,000.00*

*Funds provided by the Conservation Fund and the Chesapeake Bay Foundation

**Locations & Descriptions
Of
Ecologically Significant Area (ESA)
Restoration Project**

Restoration Plan for Campbell Complex Ecologically Significant Area

The Campbell Complex Ecologically Significant Area (ESA) is located south of the town of Pittsville in Wicomico County and west of Sixty Foot Road, adjacent to the Wicomico Demonstration Forest. This ESA contains 395.15 acres of Chesapeake Forest (CF) including all of tracts 3507 and 3536 and some stands within tracts 3539, 3598, 7123, 7148 and 7164. These tracts were previously managed by Chesapeake Forest Products Corporation to maximize pulpwood production of loblolly pine (*Pinus taeda*) by such silvicultural practices as windrow creation, bedding, wetland ditching, chemical hardwood control, fertilizing, planting of a loblolly pine monoculture and extensive road construction. Though much of the area has been impacted by man-made alterations and disturbances, 18 rare species of plants and animals, which are tracked by DNR's Natural Heritage Program, occur within the Campbell Complex (Table 1).

The size and shape of the Campbell Complex ESA (Map 1) is the result of a landscape-level conservation effort for rare and unique natural communities and the rare species found within them. The ESA boundary encompasses a powerline right-of-way (ROW) that is refuge for rare, threatened and endangered (RTE) wetland and xeric sand ridge plant species, four wetlands of special state concerns (WSSC), a number of Delmarva bays (a.k.a. "Carolina Bays") supporting a rare amphibian species, dry xeric ridges supporting a rare insect species, and a forested mosaic with rare plants that have pine-barren affinities. This ESA includes the only Maryland location and one of two Delmarva Peninsula locations for a rare pine-barren plant. The ESA boundary was delineated based on an integration of various criteria associated with rare species habitat or the potential for managing for that habitat and expanding rare species populations. These criteria included soil type, wetland type, wetland buffers, amphibian "life zones" and the actual location of rare species populations. This plan is a synopsis of potential actions to restore these community types on the Campbell Complex.

1) Delmarva Bays: Delmarva bays are elliptical-shaped, seasonally-wet depressional wetlands dominated by herbaceous vegetation. They are found on the coastal plain of the eastern U. S. from southern New Jersey to northern Florida. Bays range in size from <1 acre to >100 acres (particularly large in North and South Carolina, thus the name "Carolina Bay"). Herbaceous vegetative composition and amphibian use of Delmarva bays may change seasonally and annually based on a number of ecological factors, the principal being hydroperiod. The seasonal hydroperiod and open-canopy of these bays has made them especially important habitat for rare plants, and the lack of predatory fish has also made these bays significant breeding habitat for common and rare amphibians.

There are a number of Delmarva bays located within the Campbell Complex, some of which need management and/or restoration. A 5-acre bay (Bay#1, Map 2) located adjacent to and east of a powerline (ROW) contains a large population of a rare amphibian state-listed as In Need of Conservation. This bay is in need of restoration due to woody plant succession and a series of windrows composed of soil and other organic material that bisect the bay. The windrows were bulldozed during site preparation as part of past silvicultural activities. These windrows are now covered primarily with sapling and mature red maples (*Acer rubrum*) or sweet gum (*Liquidamber styraciflua*) that shade portions of the remaining bay. The combination of windrows and trees may also be adversely affecting the hydrology of the site. Woody plant succession is a natural process in Delmarva bays, but would normally be controlled by periodic wildfire and seasonal inundation. Since the near exclusion of fire from the natural landscape through fire suppression, woody plants have been encroaching in the bay. This bay needs to be surveyed in 2003 to determine its natural vegetative composition and for rare plant species. This information will aid in the restoration effort.

Another 15-acre Delmarva bay (Bay#2, Map 2) that is surrounded by forest roads and adjacent to an old cemetery also needs partial restoration. A small population of the rare amphibian was also found here in 2002, however due to red maple and sweet gum encroachment in that area of the bay there is little open-canopy wetland habitat. A maple-covered windrow also occurs here. A small restoration effort is needed in this 1-2 acre area of the larger bay. The majority of this bay is dominated by native shrubs and sapling trees and is not currently under consideration for management or restoration.

Restoration of these bays will involve woody plant control and removal, of windrow removal and

prescribed burning. The successful restoration of Bays#1 and #2 will be complete when natural hydrology and dimensions of the bays have been restored, windrows have been removed, native herbaceous wetland plants have colonized the areas previously covered in windrows, woody species have been removed, and the species richness of amphibians is the same or greater than pre-restoration with retention or expansion of a healthy population of the rare amphibian. Management of woody species will be a continuing maintenance activity.

2) Xeric Sand Ridges: Xeric sand ridges are the remnants of post-Pleistocene dunes, which are characterized as having dry sandy soils with sparse vegetation, often savanna-like. The soils are typically within the Parsonsburg Formation. Woody vegetation of xeric sand ridges includes short-leaf pine (*Pinus echinata*), pitch pine (*Pinus rigida*), Virginia pine (*Pinus virginiana*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), southern red oak (*Quercus falcata*), white oak (*Quercus alba*), scarlet oak (*Quercus coccinea*), water oak (*Quercus nigra*) and sand hickory (*Carya pallida*). Some sand ridges also develop dense stands of ericaceous shrubs such as blueberries (*Vaccinium* spp.) and huckleberries (*Gaylussacia* spp.), though this is not a desired outcome of our management. Herbaceous vegetation on the ridges is usually as sparse as the woody growth and is composed mostly of various sedges, grasses and forbs.

The xeric sand ridges within the Campbell Complex (Map 2) have been planted and managed as loblolly pine stands. In small patches along the ridges there are openings, which contain the native xeric sand ridge species. These small openings support at least two rare plant and animal species tracked by the Natural Heritage Program.

Restoration of xeric sand ridges will consist of a multi-stage process of removing trees to restore an open or partially-open canopy followed by prescribed burning. Successful restoration will result in the majority of the loblolly pine removed from the ridges and replaced by a stable pine-oak savanna or sparse woodland with a diverse herbaceous community dominated by native sedges, grasses, and forbs. Continuous management in the form of prescribed burns will be needed. We should also be able to record new species of rare native herbaceous plants moving into the restored area, as well as the rare animal species moving from its current limited habitat of a sandy forest road onto the restored sand ridge.

3) Forested Mosaic: The last portion of this project is the restoration of the forested mosaic, which constitutes the majority of the complex. This forest would have historically been composed of many different communities such as mixed hardwood, sand flat/pine flatwoods and dry-oak forest, creating a mosaic. Much of this area has plant species with pine-barren affinities and may have historically been a pine-barren. This entire area is now a loblolly pine plantation with most traces of the historic forest composition lost or occurring in small remnant patches. These remnant patches are where many of the rare species are found, such as the only known state wide occurrence of a particular pine-barren plant. Though this plant is common in some areas of the east coast, particularly in the New Jersey pine-barrens, the only other occurrence on the Delmarva Peninsula is at Cape Henlopen State Park, Delaware. This plant occurrence helps support the idea that this forested mosaic may have historically been a pine-barren. Typical New Jersey pine-barren vegetation is sparse forest dominated by pines (primarily pitch pine) and various oaks, with Atlantic white cedar (*Chamaecyparis thyoides*), small seasonal ponds/bays and bogs in wetland areas. Ericaceous shrubs may create dense thickets in the understory in some areas.

Many of the rare species found in the Campbell Complex historically would have occurred in this forested mosaic, but are now restricted to a large powerline ROW which runs northeast-southwest in the western portion of the complex. The ROW acts as a refuge for these rare plants because they require an early successional habitat, and all adjacent lands, which normally would have supported these species, have been converted to a loblolly pine plantation. This powerline ROW contains thirteen rare plant species actively tracked by the Natural Heritage Program.

The major goal of restoration activities will be to create an open-canopy forest or savanna. This will involve removal of loblolly pine followed by prescribed burns. Success will be reached when the entire forested mosaic is converted into early successional savanna-like habitat. This community would ideally support expanded and diverse populations of all the rare species that occur within the powerline ROW, but now in a natural setting.

Concluding Remarks: The potential to restore diverse natural terrestrial and aquatic communities has never been attempted, to our knowledge, at this scale before on the Eastern Shore of Maryland. The Campbell Complex ESA contains a diversity of unique community types and rare species actively tracked by the Natural Heritage Program, and indicates that this area is ecologically significant on the Shore. We have the potential here to restore a premier natural area.

Table 1. Rare and Uncommon Species in the Campbell Complex ESA			
Scientific Name	Common Name	State Status	Global Rank¹
<i>Aristida virgata</i>	wire grass	Endangered*	G4
<i>Cicindela scutellairs</i>	a tiger beetle	Watch list	G5
<i>Drosera capillaris</i>	pink sundew	Endangered*	G5
<i>Iris verna</i>	dwarf Iris	Endangered*	G5
<i>Eupatorium leucolepis</i>	white-bracted boneset	Threatened*	G5
<i>Kalmia angustifolia</i>	sheep-laurel	Watch list	G5
<i>Minuartia caroliniana</i>	pine-barren sandwort	Endangered*	G5
<i>Panicum aciculare</i>	bristling panicgrass	State unknown	G4
<i>anicum scabrisculum</i>	tall swamp panicgrass	Endangered*	G4
<i>Platanthera blephariglottis</i>	white fringed orchid	Threatened*	G4
<i>Platanthera cristata</i>	crested yellow orchid	Threatened*	G5
<i>Pycnanthemum setosum</i>	awned mountain mint	Watch list	G3
<i>Rana virgatipes</i>	carpenter frog	In Need of Conservation*	G5
<i>Rhynchospora torreyana</i>	Torrey's beakrush	Threatened*	G4
<i>Sabatia campanulata</i>	slender marsh pink	Endangered*	G5
<i>Scleria minor</i>	slender nutrush	Endangered*	G4
<i>Scleria triglomerata</i>	tall nutrush	Highly state rare	G5
<i>Utricularia subulata</i>	zig-zag bladderwort	Watch list	G5
Table 1			

¹ Global Rank – indicates the range wide status of a species, with G1 being the rarest globally and G5 being the most common.

- Indicate species in Maryland with legal protection status.

Monitoring